Remarks

Reconsideration of this Application respectfully is requested.

Status of the Application and Claims

Upon entry of the foregoing amendment, claims 1-26 are pending in the application, with claims 1 and 14 being the independent claims. Claims 1, 4, 13, 14, 17 and 26 are amended herein. No new matter has been added.

Summary of the Official Action

In the Official Action, claims 1-12 and 14-25 were rejected under 35 U.S.C. 102(e), as allegedly anticipated by U.S. Published Patent Application No. 2003/0086486 (Graziano).

Reconsideration and withdrawal of the rejection respectfully are requested in view of the above amendments and the following remarks.

Allowable Subject Matter

Initially, Applicants gratefully acknowledge the Examiner's indication that the application contains allowable subject matter, and that claims 13 and 26 are allowable.

In this regard, claims 13 and 26 have been amended herein to improve their form. In particular, then equation applied to determine m_i for the mid-range of $1.5 < m_{dB} \leq m_{target,dB}$ has been amended to correct a typographical error (value "0.5" changed to "1.5"); the amended equation reads:

$$\frac{2-1.5}{m_{target,dB}-1.5}(m_{dB}-1.5)+1.5 \quad \text{for} \quad 1.5 < m_{dB} \leq m_{target,dB},$$

as set forth in the specification at paragraph nos. [0021], [0031] and [0051] of the original disclosure. No new matter has been added.

Applicants believe that claims 13 and 26 remain allowable for the same reasons as set forth in the Examiner's statement of reasons for the indication of allowable subject matter in the Official Action. Namely, the Graziano '486 publication and the Steele publication do not teach selecting (or means for setting) a second noise margin m_i, where m_i (and/or a formula for determining m_i) varies based on the value of a first noise margin m, according to one of three ranges ($m_{dB} \leq 1.5$; $1.5 < m_{dB} \leq m_{target,dB}$; and $m > m_{target,dB}$), as disclosed in the application and recited in claims 13 and 26.

Formal Amendments to the Claims

Claims 1, 4, 14 and 17 have been amended herein to improve their form; specifically, the preambles of independent claims 1 and 14 have been amended to clarify that the claimed invention relates to a control method and apparatus, respectively, as recited in the body/elements of these claims; dependent claims 4 and 17 have been amended herein to provide consistency in use and clear antecedent basis for certain claim terms. Support for the amendments may be found in original application. No new matter has been added.

Favorable consideration and entry of the amendments respectfully are requested.

Rejections under 35 U.S.C. § 102

The rejection of claims 1-12 and 14-23 under 35 U.S.C. 102(e) over the Graziano '486 publication respectfully is traversed.

Independent claim 1 recites a method of controlling operation of a communications system for receiving and processing an input communication signal to produce an output communication signal, comprising the steps of:

selecting a first noise margin m relating to an external noise level present in the input communication signal;

selecting a second noise margin m_i relating to an internal noise level generated by the communications system;

calculating a virtual noise-to-signal ratio based on an external noise-to-signal ratio NSR_e, an internal noise-to-signal ratio NSR_i, said first noise margin m, and said second noise margin m_i; and

adjusting at least one operating parameter of the communications system to maintain said *virtual* noise-to-signal ratio at a predetermined margin above a required noise-to-signal ratio.

Independent claim 14 recites similar features with respect to a control apparatus for a communication system.

As discussed in greater detail in the specification, it is common practice to require that a communication system operate at a signal to noise ratio (SNR) exceeding a required signal to noise ratio (SNR_{req}) - that is, a signal to noise ratio that is required/necessary to achieve a bit error rate (BER) equal to a required bit error rate (BER_{req}) - by some factor known in the art as noise margin (referred to herein as 'm'); the noise margin corresponds to an amount of noise that the communication system can tolerate while still insuring a data transport with a bit error rate (BER) lower than a required bit error rate (BER_{req}); as further discussed in the specification the noise margin "m" may be calculated as:

$$m = SNR / SNR_{req}.$$

As stated in the application at paragraph no. [0040], "The basic idea behind the method and system described herein is to replace in the design of a communication system the use of *real* SNR values by a *virtual* SNR value, SNR_V . . . SNR_V incorporates one margin, m, against the external noise, and a different margin, m_i, against the internal noise. By choosing a margin on internal noise lower than the margin on external noise, this virtual SNR is larger than the real SNR. Nevertheless, a design based on the *virtual*

SNR still insures that the required noise margin is achieved against the external noise sources." (emphasis added).

As discussed at paragraph no. [0039] of the specification, the external noise margin and the internal noise margin may be expressed as

$$mN_V = mN_e + m_i(m)N_i \qquad (8); \text{ and}$$

$$NSR_V = NSR_e + \frac{m_i(m)}{m} NSR_i \qquad (9)$$

As disclosed at paragraph nos. [0059]-[0061], the method and system have particular utility for a multiple carrier system, where a virtual noise processor may receive external and internal noise values for multiple carriers from a noise monitoring component, and calculate a virtual noise value from the noise components, along with separate external and internal noise margins; a system parameter processor then may receive the virtual noise value from the noise processor and adjust one or more system parameters so as to maintain the virtual noise to signal ratio NSR_V at a predetermined margin above the required noise to signal ratio (i.e., to maintain the desired noise margin).

The Graziano '486 publication fails to disclose or suggest at least the features of *selecting (or means for setting)* a first (external) noise margin "m" and a second (internal) noise margin "m_i," *calculating a virtual signal to noise ratio* SNR_V, and adjusting at least one operating parameter of the communications system to maintain the *virtual* noise-to-signal ratio SNR_V at a predetermined margin above a required noise-to-signal ratio, as disclosed in the present application and recited in claims 1 and 14. As noted above, the terms "m" and "m_i" correspond to respective, *selected* noise margin values relating to an external noise level and an internal noise level (see, e.g., paragraphs

[0039] and [0040]), and the *virtual* signal to noise ratio SNR_V is calculated based on m, m_i, SNR and SNR_V. (see, e.g., Equation 9 at paragraph no. [0039]).

The Graziano '486 publication relates to a method and system for determining maximum power back off using frequency domain geometric signal to noise ratio (see title), and discloses a method and system for determining an absolute maximum power back off PBO that may be tolerated and still meet bit error rate BER (see abstract). However, Applicants submit that the Graziano '486 publication fails to disclose or suggest the above recited features of claim 1.

With respect to the features of selecting first and second noise margins (m and m_i), the portions of the Graziano '486 publication identified by the Examiner (Fig. 1b, boxes 126, 128) are understood merely to teach *measuring* a signal power (silent power spectrum and echo signal, respectively). Applicants submit that such measuring is significantly and fundamentally different than selecting (or setting) a noise margin.

With respect to the feature of calculating a *virtual* signal to noise ratio SNR_V, the portion of the Graziano '486 publication identified by the Examiner (Fig. 1b, boxes 132; paragraph [0180]) is understood merely to disclose calculating a *capacity* of the communication system - that is, the *maximum data rate* of the communication system in bits per second - based on various factors including the silence power (noise), the received power (signal + noise), the signal to noise ratio SNR, a required margin in decibels (e.g., G.SHDSL Annex B margin of approximately 6 dB), and the like (see, also, paragraphs [0177] - [0181]). Applicants submit that such calculation - *measured in bits per second* - is substantially and fundamentally different from calculating a virtual signal to noise ratio. Further, with respect to the "required margin in decibels," the

Graziano '486 publication is not understood to disclose or suggest a first margin for external noise and a second (separate) margin for internal noise, respectively.

Thus nowhere is the Graziano '486 publication understood to teach or suggest a control method or system that calculates and utilizes a *virtual* SNR based, inter alia, on separate external and internal noise margins (m and m_i). Nor is the Graziano '486 publication understood to disclose or suggest the feature of adjusting at least one operating parameter of the system to maintain such *virtual* noise to signal ratio at a predetermined margin above a required noise to signal ratio, as recited in claims 1 and 14.

Reconsideration and withdrawal of the rejection respectfully are requested.

Summation

For at least the above reasons, Applicants submit that independent claims 1 and 14 are allowable over the cited references, and are in condition for allowance.

Claims 2-13 and 15-26 depend from claims 1 and 14 and are believed allowable for the same reasons. Moreover, each of these dependent claims recite additional features in combination with the features of its respective base claim and is believed allowable in its own right. Individual consideration of the dependent claims respectively is requested.

Entry Under 37 C.F.R. 1.116

Applicants respectfully request entry of the present Amendment under 37 C.F.R. 1.116. Applicants submit that the present amendments merely are minor and formal in nature, do not add significant new issues for consideration, and present the claims in better form for appeal. Favorable consideration and entry of the Amendments respectfully are requested.

Conclusion

Applicants believe that the present Amendment is responsive to each of the points raised by the Examiner in the Official Action, and submit that the application is in condition for allowance. Favorable consideration of the claims and passage to issue of the application at the Examiner's earliest convenience earnestly are solicited.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Christopher Philip Wrist
Attorney for Applicants
Registration No. 32,078

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1100 New York Avenue, N.W.
Washington, D.C. 20005-3934
(202) 371-2600

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